Specular Infini-D 3.1 Addendum

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Infini-D 3.1 Addendum

INTRODUCTION

Infini-D is now over four years old, and going stronger than ever. With the constant flow of new and exciting advances in the world of 3D graphics, our users are pushing Infini-D's limits further and further each day.

This means that people are always expecting more out of Infini-D.

Specular strives to keep abreast of changing technology and users' needs. When we released Infini-D 3.0 with its revolutionary modeler and its heightened animation controls, we promised that the next upgrade would be free to all registered owners of 3.0. We knew that users would want to take advantage of Apple's new QuickDraw 3D™ and QuickTime VR™ technologies. We also knew that we would be able to further optimize some other standard features, like ray tracing and QuickTime surface mapping.

This is the upgrade you've been waiting for: Infini-D 3.1. We hope you enjoy it. We think it's made Infini-D better than ever before!

FIRST TIME INFINI-D USERS

Addenda traditionally cause new users problems because they contain information that supersedes the information in the original manual. This addendum is no exception. If you are a new user, we advise you to go through the Tutorial before looking at this addendum, as it provides an overview of some basic concepts not included in this addendum. Keep this addendum on hand, however, to help you through the areas of Infini-D that have been modified since Infini-D 3.0 was released.

Technical Support

To receive technical support, you must send in your registration card. Technical support is available Monday through Friday from 10am to 6pm Eastern Standard Time at (413) 253-0499. Be sure to have your serial number available when you call.

Specular also maintains user forums on America Online and CompuServe. Both are excellent venues in which to ask questions from and exchange ideas with other users and Specular staff.

On America Online, use Keyword: SPECULAR

On CompuServe, use Go: MULTIVEN

We have also added a World Wide Web page to our list of network resources.

http://www.specular.com

As always, we are very interested in hearing your feedback. All of Infini-D's changes and improvements have been based on user response. If you have comments or feature requests, please send them to:

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Infini-D Product Manager
479 West Street
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You may send electronic mail to us at:

AppleLink: SPECULAR

America Online: Spec3D

CompuServe: 75300, 2715

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NEW FEATURE OVERVIEW

Here is a brief list of the new features we've added since the release of Infini-D 3.0:

Apple QuickDraw 3D™ Support

Infini-D now supports Apple's new QuickDraw 3D (QD3D) technology in a number of ways, including interactive rendering, support for hardware acceleration, and import and export of the 3D file format.

Drag-and-Drop

Infini-D allows models and textures to be dragged from other applications directly into your scene without the need for using standard open file dialogs.

Ray Tracing Optimizations

Infini-D's ray tracing algorithms have been improved to provide rendering speeds similar to version 2.6 for all objects.

QuickTime Surface Mapping Improvements

Controls to set the beginning, ending, and looping of QuickTime movies have been added to the import dialog.

QuickTime VR™ Support

QuickTime Virtual Reality (QTVR) is supported through an Animation Assistant which creates a camera path for QTVR object movies and by rendering a panoramic image for QTVR Panoramas. The resulting fields can then be used with Apple's QTVR Authoring Tools Suite.

Program Modifications

Several changes to existing program features have been made, particularly in the Workshop, to improve productivity and ease of use.

QUICKDRAW 3D SUPPORT

QuickDraw 3D (QD3D) is an exciting new technology developed by Apple Computer which provides system-level support for 3D information. The most prominent benefits to the Macintosh user are interactive rendering, hardware acceleration, and a standard file format for transporting 3D information between applications.

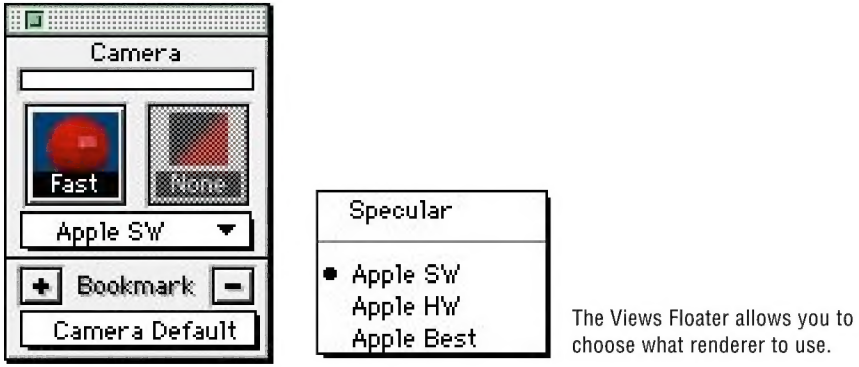
Interactive Rendering

Infini-D now allows users to utilize the QuickDraw 3D renderer from within Infini-D. This provides near instantaneous object rendering and manipulation at the click of a mouse.

For example, you can now rotate a model by hand, and see a shaded image of the model rotating in near real-time right before your eyes, rather than a simple wireframe bounding box. You can also watch near real-time screen rendered previews of your animations with the "Animate" command, before committing yourself to spooling the final file to disk.

When a QuickDraw 3D renderer is selected, moving, rotating, and scaling of objects will take place in the specified shading mode for each window. Lights and cameras are not moved in this interactive manner. They are manipulated in the usual fashion and are updated afterward.

To use any of the QuickDraw 3D functions, the QuickDraw 3D extension must be installed. (This comes on the Infini-D installation disks.) When QuickDraw 3D is installed, Infini-D's Views floater contains an additional pop-up menu which allows you to choose one of several available renderers.

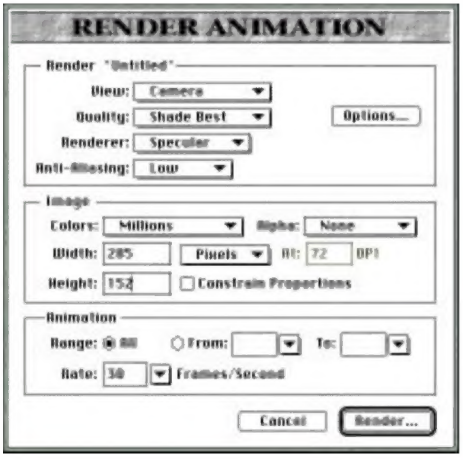


The Views Floater allows you to choose what renderer to use.

The default renderer is "Specular," meaning Infini-D's own built-in rendering engine. QD3D options include "Apple SW" (Apple Software), "Apple HW" (Apple Hardware), and "QD3D Best." Apple SW uses the software renderer built in to the QuickDraw 3D extension. Apple HW uses the apple accelerator card, if it is installed. QD3D Best will choose the "best" available QD3D renderer (i.e., the one that supports the most features). If you have a QD3D accelerator card installed from someone other than Apple, choose QD3D Best as your renderer to access it.

The shading mode section of the Views pop-up floater has not changed, since all of Infini-D's shading modes have approximate QD3D equivalents. All of the supported options for a QD3D renderer (such as transparency, shadows, etc.) will work if Shade Best is chosen. Please note that if a QD3D renderer is chosen, the anti-aliasing pop-up menu is dimmed, and you will not be able to select anti-aliasing in the Views floater.

The Render Image and Render Animation dialog boxes now have an additional pop-up menu from which you can choose the renderer. The choices are the same as the pop-up menu in the Views floater: Specular, Apple SW, Apple HW, and QD3D Best. Please note again that there is a direct relationship between the renderer, the shading mode, and anti-aliasing, since QD3D does not currently support anti-aliasing or ray tracing. For example, if a QD3D renderer is chosen, the anti-aliasing menu is dimmed. If an anti-aliasing level is subsequently chosen elsewhere, the renderer will return to "Specular." If "Ray Trace" is chosen as the rendering mode, the chosen renderer returns to "Specular."



The Render Image and Render Animation dialog boxes now allow you to choose which renderer to use for output.

Interactivity versus Final-quality

It is important to note that Infini-D's renderer is different from QD3D renderers in a number of ways. For example, QD3D renderers currently cannot perform ray-tracing or anti-aliasing functions. Transparency can only be simulated, and even then only with a hardware renderer. This being the case, it becomes obvious that QuickDraw 3D is currently designed to improve the feedback you get from Infini-D, not for final-quality output. To achieve the high-quality output you desire, you must use Infini-D's own renderer ("Specular"). But note that the Specular renderer does not provide real-time interactive rendering.

Surfaces and Textures with QuickDraw 3D

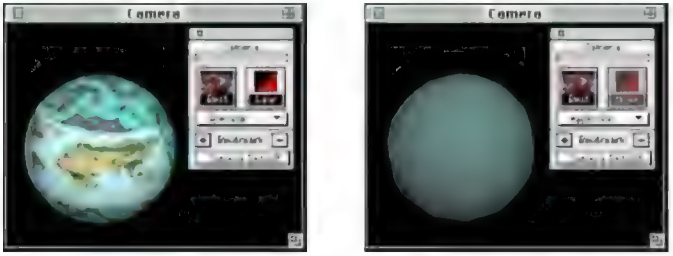
Currently, Infini-D native surfaces and textures are not fully supported by the QD3D renderer. Attributes such as basic color, shininess, and transparency are honored, but color maps like marble and wood, and effects like wave and bump are not. Therefore, you will need to use Infini-D's own renderer ("Specular") to get those classic Infini-D surface effects.

QD3D can not render all of the surface attributes that Infini-D can create.

Using a PICT file as a texture map is supported by both renderers (QD3D and Infini-D's own). However the method which QD3D uses to place a texture on an object is different from the way Infini-D does so, and the results will therefore not be the same.

QD3D sometimes renders image texture maps differently from Infini-D.

This issue is amplified when you are using a Composed Surface, as QuickDraw 3D has no knowledge of how to render a composed surface. In these cases, Infini-D will simply use the main color of the first layer in the composed surface to represent the shaded object.



QD3D can not render an Infini-D Composed Surface. It will always use the first color layer in the layer list.

RAM Requirements with QuickDraw 3D

It may come as no surprise that much of the reason behind the speed of QuickDraw 3D is that it uses RAM (Random Access Memory) intensively. As you create more geometry, QuickDraw 3D requires more RAM to render it. The difficulty for Infini-D is that QuickDraw 3D is using more RAM in the *system,* not in Infini-D itself. If you choose "About This Macintosh" from the Apple Menu, you will notice that the size of your system increases as you render more complex scenes with QuickDraw 3D.

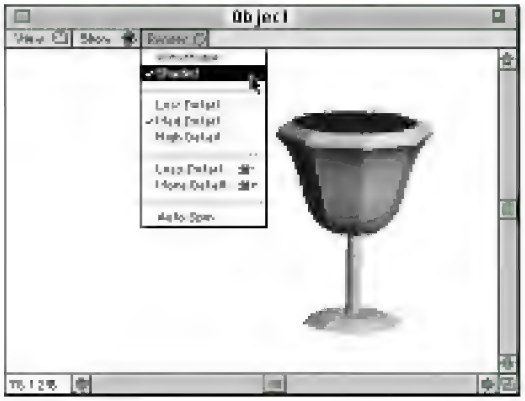
The system can eventually grow so large that QuickDraw 3D can not be used.

Infini-D has no control over the amount of RAM the system uses, and eventually the system can grow so large that Infini-D can no longer use QuickDraw 3D, or other functions, because of the lack of available RAM.

QuickDraw 3D in the Workshop

Infini-D's object creation Workshop also has access to the interactive QD3D renderer. This can help tremendously when designing an object since you can see it shaded rather than in only a wireframe mode.

The Render menu of the Object view window in the Workshop contains two new items: Shaded and AutoSpin.



Real-time shading with QuickDraw 3D is also available in the workshop.

When the Shaded menu item is selected, Infini-D uses QuickDraw 3D with the "Best" renderer to draw the object.

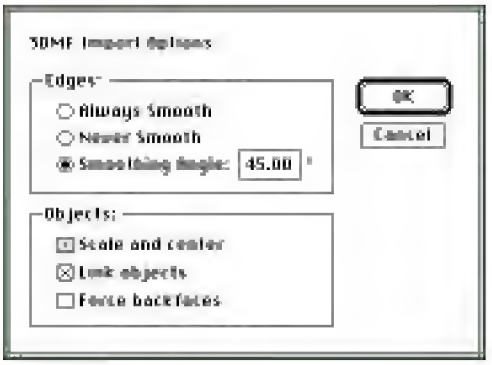
When AutoSpin is selected, the object continually rotates the in the direction that the mouse is moved. This allows you to see all sides of a model as it is being edited in the Workshop.

The 3D Metafile (3DMF)

A significant feature of QuickDraw 3D is the advent of the 3D Metafile, or 3DMF. This is a new file format, developed and supported by Apple Computer, to make translation of 3D information between programs much easier and more stable than ever before.

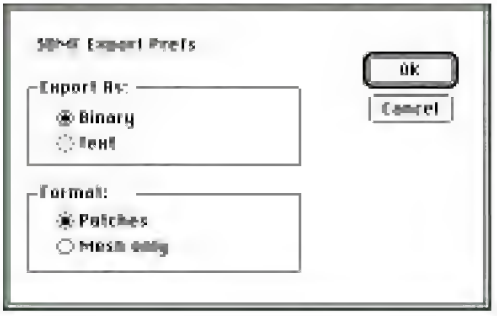
Infini-D's Import Objects and Export Objects dialog boxes now have 3DMF as an additional option in the pop-up menu. For each, there is a set of options to customize how the objects are handled.

For importing of 3DMF files, the options are the same as when importing DXF files. See the Infini-D User's Manual for a complete description of these options. Infini-D can currently import only geometry which has been saved as a 3D mesh. (Geometry saved as NURBs is not imported.) Image maps and surface information such as diffuse color, specularity, and reflectivity are also imported. Camera and light objects are not imported from 3DMF files.



The 3DMF import dialog allows you to set certain options for the imported objects.

When a scene is saved as a 3DMF file, all contents of the scene are saved, including objects, cameras, and lights. Objects can be saved as "Meshes Only" which is the most widely accepted format, or as "Patches" which writes information as both NURBs and Tri-grids. Cameras are saved with position, orientation, and focal length, and lights retain information about light type, color, and intensity.



The 3DMF export dialog allows you to set certain options for the exported objects.

In addition, 3DMF files can be saved as either a Text or Binary file. Binary files are generally smaller and faster to read and write, while text files are more versatile as they can be used on other computer platforms. Text files can also be viewed and "debugged" using a word processor.

QD3D Technical Support

For technical support concerning QuickDraw 3D installation, configuration, setup, and general use, please contact your Apple dealer, or the Apple Technical Support line at 800-767-2775.

DRAG-AND-DROP

Drag-and-Drop is another Apple technology now supported by Infini-D. With System 7.0 or 7.1 you will need the Drag and Drop extension. The capability is built into System 7.5 and later. With Drag and Drop installed, Infini-D is capable of dragging objects and images to and from other applications.

Objects can be dragged from Infini-D into other apps which support both drag-and-drop and 3DMF such as the Scrapbook, the Finder, or other 3D applications. To do so, simply click on an object in Infini-D and drag it into a window of the receiving application. Objects can be dragged into Infini-D as 3DMF files from these same applications in the same manner. The window border of the receiving application will highlight to indicate that the object being dragged can be accepted.

When objects are dragged to and from Infini-D, they are always transported as 3DMF files (as opposed to DXF). The Import Options dialog box will not appear, rather the options from the last time the dialog box was invoked will be used.

PICT files (images saved in the PICT file format) can be dragged into Infini-D from applications which support drag-and-drop. If a PICT file is dragged to an object, it is added to the Surface Library and becomes that object's surface. When a PICT is dragged on top of an object, the object is highlighted with a bounding box to help determine which object will receive the image. If the PICT is dragged to a window, it is added to the Surface Library and becomes the background image.

QUICKTIME SURFACE MAPPING CONTROL

QuickTime movies can be mapped onto your models by choosing Apply Surface from the RENDER menu or by using Infini-D's Surface Composition dialog box. The movies will actually "play" on the surfaces of your models as your animation progresses. QuickTime movies can also be used as backdrops or environment maps.

Infini-D 3.1 now offers new controls to tell Infini-D how to use your imported QuickTime movies. The Get Image dialog now has a "QT Options" button, which brings up the QuickTime options dialog box. This button is only enabled when a QuickTime movie has been loaded through the Import Image dialog box.

The QuickTime Options dialog box allows you to customize the playback of the movie in your scene.

The QuickTime Options dialog contains the following features to control the behavior of a QuickTime movie:

Frames to Play

This box allows the user to select a range of frames by holding down the SHIFT key and dragging the controller. Only those frames in the selected range will be used. The default is to have all frames selected.

Lead In Frame

If the imported movie does not start at the beginning of the Infini-D sequence, this is the frame that will be displayed until it begins playing. The default is the first frame.

Lead Out Frame

If the imported movie is not set to loop, this frame will be displayed until the end of the Infini-D sequence. The default is the last frame.

When Finished

This allows the user to decide if the imported movie should loop or display the lead out frame when it is finished playing.

Start Time in Scene

The value entered here is the time in the Infini-D sequence that the imported QuickTime movie will begin playing. Until that time, the lead in frame will be displayed.

Playback Rate

This number is a time scaling factor, allowing the user to select the speed at which the imported movie is played. A value of 2.0 will play it at twice the speed (and finish in half the time); 0.5 will play it at half the speed, taking twice as long to play. Negative values will make the imported movie play in reverse.

Please note that these QuickTime options do not control the behavior of your final Infini-D rendered animation. They only affect the behavior of your imported QuickTime movies, and the way that they behave in your final Infini-D rendered animation.

QUICKTIME VR™

QuickTime Virtual Reality (QTVR) is another new technology from Apple which allows user interactivity within QuickTime movies. Apple's QuickTime VR Authoring Tools Suite is required to build QTVR movies. This software is not provided by Specular and must be purchased from Apple.

There are two kinds of QTVR movies supported by Infini-D. The first is a QTVR *object* movie. This is an interactive movie which allows you to rotate an object or group of objects by clicking and dragging the mouse. They are only interactive when played through a special QTVR movie player.

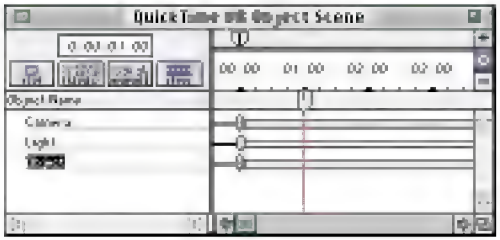
The second is a QTVR panoramic movie. This is an interactive movie which allows you to pan through a scene left, right, up, and down, and even zoom in. Like QTVR object movies, they can be viewed interactively with a QTVR movie player.

Each movie type is created in a different fashion in Infini-D. Object movies use an Animation Assistant, while panoramas employ a special rendering technique. Each one generates a file needed to create QTVR movies in conjunction with Apple's QuickTime VR Authoring Tools Suite.

QTVR Object Movies

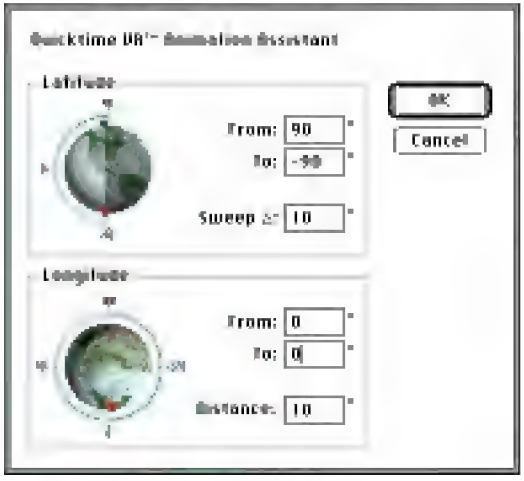
This animation assistant will cause your camera to circle around an object within a pre-determined sphere, taking "shots" of the object at many different angles. The resulting file, when viewed with a standard movie player, will look like the object itself is spinning around on a changing axis. With a navigable movie player, this file can be converted to a QTVR object movie, and viewed interactively.

Before applying this animation assistant, be sure that your model is complete and that the Sequencer does not contain any animation (i.e. the object and the camera should each have only one Eventmark).



To use the QTVR Object Animation Assistant, you must select the Eventmarks for the camera and the desired object.

Select the camera's Eventmark. Then hold the SHIFT key and click on the object's Eventmark (if your model contains hierarchies, make sure you SHIFT-click on the parent object's Eventmark). When these two Eventmarks are selected, select the "QuickTime VR Object" Animation Assistant, from the ANIMATE menu.



The QTVR Object Animation Assistant allows you to choose how much of the object to render for the QTVR movie.

The dialog box which appears asks you to specify the latitude and longitude of the camera's path as it revolves around the model. This will determine how far the object can be rotated interactively in the final QTVR object movie. The default settings will give you full 360° rotation in all directions. If it is not necessary to see certain sides of an object in your QTVR object movie, you can reduce the final file size (and rendering time) by reducing the lengths of the latitude and longitude arcs. The more you decrease the size of the **Latitude** arc, the less of an object's "top" or "bottom" will be accessible through QTVR interactive rotation. The more you decrease the size of the **Longitude** arc, the less of an object's "back" or "front" will be accessible.

The small globes in the left half of this dialog will help you visualize the relationship between your model and the latitude/longitude arcs. The globe in the Latitude box represents an object as it would appear in the Front view window. The globe in the Longitude box represents an object as it would appear in the Top view window.

The latitude and longitude arc lengths are controlled by the numbers in the **From** and **To** boxes. You can change these numbers numerically by typing directly into the boxes, or manually by dragging the ends of the arc representations (which appear around the small globes in the left half of the dialog). The lighter parts of the globe are the portions that will be shown, the darker parts will not. The camera moves in a counter-clockwise fashion from the green dot ("From") to the red dot ("To"). When you've set the arc lengths, write the From and To values down; you'll need them later when you convert to QTVR.

The **Sweep** Δ control in the Latitude box sets the number of vertical degrees between each of the camera's longitudinal revolutions. The default Sweep value is 10°. Lower sweep values mean more frames in your final movie (which means longer rendering time and larger file sizes). But with a low sweep value, you can achieve smoother interactive rotations in your resulting QTVR object movie.

The **Distance** control in the Longitude box sets the distance of the camera from the center of the object. The smaller the distance, the closer the object will appear in your final movie.

Clicking OK will apply the assistant, and create the Eventmarks for the Camera. If you preview the animation in any window where both the object and the camera are visible, you will get a better idea of what the Camera is doing.

Render the animation out from the Camera window. The frame rate you choose determines how smooth the resulting QTVR movie will play. We recommend at least 36 frames per second if you are doing a complete 360° revolution in the object (defined by the longitude values) as this will create a frame for every 10° around the object.

Since QTVR object movies require complete keyframes in the QuickTime movie, you should render out as PICS, or as QuickTime with Compression: None. This latter choice can create rather large QuickTime movies, so another alternative would be to render using your favorite compressor (Animation is recommended) and then use a utility such as Apple's MovieConverter and re-save it with a keyframe at every frame. If you render to a PICS file, you can use any QuickTime playing utility such as PetersPlayer or Apple's MovieConverter to open the file and re-save it as a QuickTime movie with keyframes at every frame.

When the file has been rendered, it can be converted to QTVR through Apple's Navigable MoviePlayer. (Navigable MoviePlayer is part of Apple's QuickTime VR Authoring Tools Suite. It is not included with Infini-D.) To do this, simply launch the player, open the Infini-D file you just rendered, and choose Add Navigable Data from the EDIT menu.

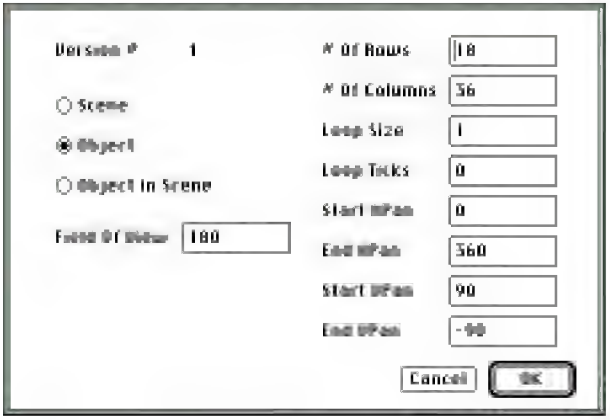
Now it's time for a little math. Look at the numbers you wrote down for the Latitude degrees which you specified in the Infini-D animation assistant dialog. Subtract the "To" value from the "From" value. (The default is -90 minus 90, or -180.) Now take this difference and divide it by the Sweep Δ value (the default is 10°). Enter this quotient into the **Rows** box in the navigable player's import dialog. (If you used the defaults this would be 18 rows. Always enter positive values.)

The **Columns** value you should enter here is simply the frame rate at which the Infini-D animation was rendered.

The **Start HPan** and **End HPan** values represent how far around the object you rendered. The default in the Infini-D Animation Assistant is from 0° to 0°. This equates to 0° to 360° in the Navigable MoviePlayer dialog box. (These are the default values.)

The **Start VPan** and **End VPan** values correspond directly to the Latitude "From" and "To" values you entered in the Animation Assistant dialog. Enter those values here.

All the other text boxes should be left as is for a QTVR Object movie.



Use the default settings in Infini-D's QTVR Animation Assistant and enter these values for a QTVR object movie.

In short, these are the basic steps required to create a QTVR object movie:

1. **Create an object.**
2. **Open the sequencer and select the Eventmarks for the Camera and your object.**
   (There should be only one for each.)
3. **From the ANIMATION Menu, choose the QuickTime VR Object Animation Assistant.**
4. **Set the camera boundaries or click OK to accept the default values.**
   (This produces a smooth movie showing all sides of the object.)
5. **Render the animation.**
   Set the frames per second to 36 for a reasonably smooth movie.
6. **The output file type should be either PICS or a QuickTime with compression set to "None."**
7. **Launch the Navigable MoviePlayer application.**
   Open the QuickTime movie you just rendered.
8. **Choose "Add Navigable Data" from the EDIT menu and enter the numbers from the dialog above.**
9. **Voila! QuickTime VR Object movie!**

QTVR Panoramas

The process for creating a QTVR panorama is different than that for a QTVR object movie. Rather than viewing a single object, your movie will be an interactive view of an entire scene. This means that your scene should have as much detail as possible to create an interesting QTVR panorama.

QuickTime panoramas require Apple's QuickTime VR Authoring Tools Suite which is not included with Infini-D. Some knowledge of MPW scripts is also required to achieve reasonable results.

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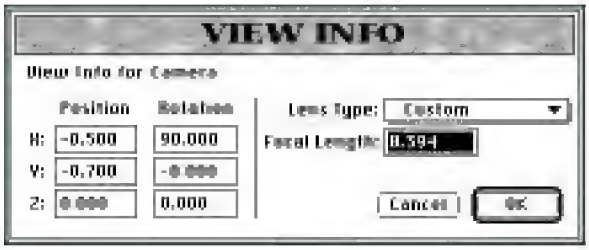
1. **Create your 3D scene.**
   Place the camera in a centrally located position. The camera should be perfectly level. (The X rotation value should be 90 and the Y rotation value should be 0.) Place it at a height which allows you to see an adequate amount of your scene.
2. **Double-click on the camera object and set the focal length of the camera lens in the View Info dialog box.**
   The focal length determines how far up and down you will be able to see and pan in the final QTVR movie. Smaller focal lengths (or wide-angle lenses) allow you to view more of the scene. A focal length of 8.394 results in an 85° vertical pan angle, which is the default for QTVR.



Set the focal length of the Camera view to 8.394 for an 85° vertical pan angle.

The vertical pan angle value is required for creating the QTVR panorama movie in the QTVR kit. The following table indicates some other focal lengths and resulting pan angles.

Focal Length	Vertical Pan Angle
50	17.492°
24	34.543°
14	57.573°
8.394	85°
7.692	90°
6	104.092°
5	113.952°

Note that these values are dependent upon the aspect ratio of the window. The window must be 3.25 times longer than it is wide. There are pre-defined window sizes in Infini-D which conform to this ratio.

3. **Make sure all of your camera and light objects are invisible.**
   Since panoramas are ray traced, these objects will appear in anything reflective unless they are made invisible. If the camera you are rendering from is not invisible, it may appear in parts of the rendered image.

4. **Choose "Panorama" from the Render hierarchical menu under the FILE menu.**

5. **The dialog box which appears is similar to the standard Render Image dialog box.**
   Two notable exceptions are that you can only choose Camera views to render (the menu item will be dimmed if there are no cameras) and that the rendering quality must be Ray Trace.

The Render Panorama dialog box allows you to choose a window size and horizontal pan angle.

6. **Choose a size for your QTVR panorama.**
   There are three pre-set window sizes in Infini-D. The smallest is for creating preview picture to examine. The other two are both sufficient to create a QTVR panoramic movie. The largest will create a higher quality result, although it will take longer to render and requires more memory. All three window sizes conform to the 3.25 aspect ratio required by QTVR. Deviating from these standard sizes can easily produce undesirable and unpredictable results. The horizontal pan value lets you render a panorama that is less than 360°.

7. **When the rendering is complete, you will have a panoramic PICT that is ready to be used in the QTVR Authoring Tools kit.**
   The QTVR kit requires that your PICT first be rotated 90° counter-clockwise (using an image processing tool such as Adobe Photoshop). It can then be used in the QTVR Dicer tool to create the QTVR movie. A sample MPW script is included on the Infini-D CD-ROM to help illustrate how to create the QTVR movie from the PICT.

OTHER CHANGES

While Specular is continually adding new features to improve Infini-D, we also strive to ensure that the existing features work in a natural way, improving your work flow. With that in mind, a few changes to program operation have been made.

Twisting Cross-sections

It has been brought to our attention that it is sometimes difficult to use the "Twist" command in the Workshop because cross-sections are not easily selected. With this

in mind we have added an additional way to access the Twist function.

Rather than having to select the cross-section in the Path View windows, you can now also use the Cross-section Marker to identify a cross-section for manipulation. Simply drag the Cross-section Marker to a cross-section in a Path View window, or select a cross-section in the Cross-section View, and then use the Twist command as you normally would. The Twist menu item will be accessible any time the cross-section marker is on a cross-section.

Rotating Cross-sections

As with the problem of selecting cross-sections for using Twist, we have also made it easier to rotate a cross-section in the Workshop. Again, the cross-section marker is moved to the desired cross-section in a Path View window. Then simply select the Rotate tool and drag in the Path view window to rotate the cross-section. Note that there must not be anything else selected in the window in order for cross-section rotation to operate in this manner.

Other Cross-section Changes

Two other modifications have been made with regard to cross-sections in the Workshop.

The first change is that if end caps are shown in a Path View window, a cross-section at that point will also be visible and editable. In other words, the cross-section is now drawn *on top of* the end cap.

The second change is that cross-sections are now visible and accessible even if the Path is not active or shown.

The Object Library

The layout of the Object Library in the Workshop has been slightly modified to utilize less screen space and more clearly represent the functions of the buttons.

The Object Library has clearer indications of the functions of the buttons.

New Window Sizes

There are several new pre-defined window sizes in the Window Options dialog box. The most notable is 720 x 534 — NTSC 2. This size has been requested by users who use our software in conjunction with certain digital video editing equipment.

The aspect ratio of this window size (1.34) is very close to the standard 640 x 480 window size (with an aspect ratio of 1.33). If you are using an off-line digital video system you can directly scale your image or animation to 640 x 480. (We recommend using Adobe Photoshop or a batch processing program such as Debabelizer.)

This 720 x 534 size is also useful for going directly to NTSC video. In this case, you would scale vertically by 91% to achieve a size of 720 x 486. This gives the exact size for NTSC video as well as the correct pixel aspect ratio. (Pixels in NTSC are wider than they are high, while on the computer they are square.)

Optimized Ray Tracing

Ray-tracing is the highest level of rendering available in Infini-D. It produces photorealistic effects by generating highly detailed reflections, transparencies with real world refraction indices, and shadows. No other rendering mode will produce true reflectivity or transparency; on the other hand, if your scene does not require true reflections or transparency, you will save time by using Shade Best as your rendering mode.

Ray-tracing can be done with Infini-D's own rendering engine; it cannot, however, be done with QD3D renderers. Some QD3D hardware accelerators can generate shadows and transparencies in Shade Best; Software QD3D will not.

Although Infini-D 3.0 increased rendering speeds for shaded objects, the new SplineForm modeler caused significant performance degradation when ray-tracing. In Infini-D 3.1, new algorithms have been implemented to increase rendering speeds for extrusions, lathes, and general SplineForm objects.

Ray-tracing tends to take longer for more complex scenes; that is, scenes which have many objects, complex models, high levels of anti-aliasing, shadows, or multiple light sources. Cutting down on any of these things will also cut down your rendering time.

These are some notes and changes which were inadvertently excluded from the original manual.

Tips on Morphing

There are several things to keep in mind when morphing between two objects in the workshop. The first is that the direction of the path is critical; the path of both objects must go in roughly the same direction. For example, if the path of one starts at the top and goes down, and the other object starts at the bottom and goes up, the resulting morph could be quite undesirable.

The other thing to keep in mind is the way that cross-sections "morph" from one to the next within the same object. If two cross-sections have the same number of points, then there will be a direct one to one correspondence between them. If one of the cross-sections is rotated then the object will twist. However, if the two cross-sections have different numbers of points, then Infini-D employs a "smart point-matching" technique. This causes points on one cross-section to go to the closest point on the next cross-section. In cases where one cross-section is much larger than another, this can create kinks and twists as all of the points of the smaller one may collapse into a single point of the larger.

Average Velocity

An additional velocity function called "Average Velocity" was added to the velocity graph after the manual went to print. Average velocity causes animation to behave like it did in prior versions of Infini-D. The speed between any two Eventmarks will be constant, but the Eventmarks will be "split" to allow this to happen. Some uneven jumps in velocity may occur.

Tips on Bending the Path

When bending the path in the workshop, use care not to bend it too far. If the path is bent more than 130°, Infini-D thinks you are trying to create an object which folds in on itself and can give unexpected results. This also applies if you wish to turn an object upside-down. Rather than selecting the path and rotating 180°, perform the rotation in two steps of 90° each.

Layer Info for Decal Mapping

The Layer Info dialog box for Decal mapping in surface composition has two additional items which are not described in the manual. The Flip item allows you to flip the image horizontally, vertically, or in both directions on your object. The Rotation item enables you to rotate the image 90° in either direction or 180°.

Option-dragging Eventmarks in the Sequencer

When duplicating an Eventmark by holding down the option-key, all sub-events (position, rotation, scale, etc.) are duplicated EXCEPT for the "Other Info" event if the object is created in the workshop (as opposed to cameras, lights, text, etc.). However, if the Sequencer is expanded to show the object's sub-events the "Other Info" event will be duplicated and the Sequencer will indicate that there is animation occurring.

Select Unused Surfaces

Choosing "Select Unused Surfaces" from within the Surface Library will select all those surfaces that are not currently in use. However, if there is a surface which is part of a composed surface or a tile surface, it will not be highlighted, regardless of whether it's in use or not.

Animation Assistants and NULL (Empty) Events

The Animation Assistant structure has not been changed from the prior version of Infini-D. When using animation assistants, NULL (empty) Eventmarks will be created for all sub-events (position, rotation, etc.) even if they are not affected by the assistant. You may need to manually remove the extra events.